TRANSLATION

[19] FEDERAL REPUBLIC OF GERMANY

GERMAN PATENT AND TRADEMARK OFFICE

[12] Preliminary Published Application

[10] DE 198 23 926 A1

[51] Int. Cl.[6]:
D 04 H 1/42
D 04 H 1/54
A 41 D 27/06
D 01 F 6/60

[21] Application number: 198 23 926.2

[22] Date of filing: May 28, 1998

[43] Date of publication of application: December 2, 1999

DE 198 23 926 A1

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[56] References cited:
DE-OS 20 36 800
EP 0,728,855 A1
DE-B.: Sroka, Peter: Handbuch der textilen Fixiereinlagen [Manual of textile fusible interlining], 3rd edition, published by Hartung-Gorre Verlag, 1993, pages 15 to 19

The information presented below was taken from the documentation submitted by the applicant.

A request for an examination pursuant to § 44 of the German Patent Law (PatG) has been filed.

[54] Textile interlining nonwovens made of thermoplastic flat fibers.

[57] The invention relates to textile interlining nonwovens that are made up of fibers and that comprise, at least partially, thermoplastic flat fibers. Furthermore, the invention relates to the use of thermoplastic flat fibers for the manufacture of a textile interlining nonwoven.

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Description

The present invention relates to textile interlining nonwovens that are made up of staple fibers and that comprise, at least partially, thermoplastic flat fibers. Moreover, the invention relates to the use of thermoplastic flat fibers for the manufacture of textile interlining nonwovens.

In the clothing industry, so-called fabrication auxiliaries are used in the production of clothing. These fabrication auxiliaries, which are also referred to as textile interlining fabrics or as textile fusible interlining, serve for shaping, blind-stitching, securing and underpicking during the fabrication of articles of clothing. These textile interlining fabrics can be used especially when shaping of the article of clothing with good recovery properties is desired. As a rule, these textile interlining fabrics are permanently joined to an outer textile fabric, a process in which the textile interlining fabrics are sewed, glued, fused or otherwise joined to the outer fabric. The textile interlining fabrics impart, for example, a high dimensional stability, a smooth appearance and a flawless fit to the articles of clothing. These textile interlining fabrics can be woven, knit or nonwoven fabrics. In this context, reference is made to Peter Sroka, "Handbuch der textilen Fixiereinlagen" [Manual of textile fusible interlining], 3rd edition, 1993, published by Hartung-Gorre Verlag of Constance, Germany.

The term "nonwoven" refers to a flat textile structure consisting of fibers whose cohesion is achieved by the fiber's inherent adhesion and/or fibers that are bonded by means of mechanical or thermal methods or else by a chemical process.

In an extremely advantageous manner, nonwoven fabrics or webs made of fiber blends that contain, at least partially, the polyamide 6 staple fibers used according to the invention allow an adhesive bonding (web bonding). Thermofusion ovens (belt or suction-drum principle), for example, can be used for the bonding procedure, or else the webs are heated, for instance, on rolling calenders equipped with smooth rollers or on embossing calenders (an engraving roller against a smooth roller).

Moreover, the web bonding can be done by means of so-called thermobonding in which the fibers are melted by heat in a punctiform manner as a result of partial thermosetting or else by means of punctiform fusing using a heated needle roller.

Naturally, it is also possible to employ familiar methods for the web production. For instance, the nonwovens can be mechanically joined by needling, or else by chemical bonding with binders, by hydrodynamic joining, also joining by solubilizing the fibers with suitable solvents as well as a combination of these methods.

Textile interlining nonwoven should have a high degree of softness (soft hand), good covering capacity, high durability and dimensional stability. Besides, the lowest possible degree of penetration adhesion should be ensured. Especially in the case of light-weight interlining nonwovens (< 25 g/m^2), problems arise in terms of penetration adhesion and covering capacity owing to the low web thickness and the web cloudiness that is more readily noticeable there.

Consequently, there is a need for textile interlining nonwovens that do not entail the above-mentioned drawbacks, that is to say, that exhibit, in particular, better covering capacity, less penetration adhesion and a softer hand.

Consequently, the objective of the invention is to create textile interlining nonwovens that have the above-mentioned properties.

The objective of the invention is achieved by producing textile interlining nonwovens according to Claim 1 whereby the textile interlining nonwoven is made up of staple fibers and encompasses, at least partially, thermoplastic flat fibers.

The subordinate claims contain advantageous embodiments of the invention.

As defined by the invention, a textile interlining nonwoven refers to any two-dimensional or three-dimensional web that is suitable to impart dimensional stability to other flat textile structures made, for instance, of synthetic or natural textile fabrics, for example, in the form of articles of clothing, blankets or pillows. As defined by the invention, the term textile interlining nonwoven also refers to so-called fusible interlining that is utilized in articles of clothing as:

- stabilizing interlining to offset the diagonal bias of outer fabrics as well as, for instance, to reinforce buttonholes or buttons;
- stiffening fusible interlining, in order to impart a certain stiffness, for example, to waistbands, belts, collars;
- shaping fusible interlining in order to impart good recovery properties and shape retention to an article of clothing as well as to quickly counter wrinkles; and
- filling fusible interlining, in order to impart volume and fullness to an article of clothing, for example, shoulder pads and armhole supports.

Moreover, the textile interlining nonwoven according to the present invention can be used to fuse the front or large pieces, specifically the large-surface front pieces for the shoulder, chest, waist and hip areas, including processing by adhesion.

Furthermore, the textile interlining nonwoven can be used to fuse small pieces such as lapels, collars, neckbands, armhole reinforcements, raglan supports, shoulder caps, collar sections, yokes, trims, tabs, bands, underarms, sleeves, edgings, waistbands, slits, hems, facings, pocket flaps, darts, cuffs, belts, button bands, buttonhole bands, knee linings, quilted substrates, etc.

The textile interlining nonwoven according to the invention can be manufactured completely on the basis of thermoplastic flat fibers or else in a blend with other fibers and materials. The precise percentage of thermoplastic flat fibers in the textile interlining nonwoven depends, for example, on the type of area to be stabilized in an article of clothing.

As defined by the invention, a flat fiber is any fiber that does not have a circular cross section and moreover, that has a length-to-width (L-to-b) ratio that is greater than 1.3. The length L and the width b each refer to the outer, maximum dimensions of the fiber cross section projected onto a plane. For further illustration, please refer to Figures 1 through 4.

By using flat fibers, compared to conventional fibers that have a circular cross section, a higher covering capacity is achieved with the same fiber titer and with the same weight per unit area of the textile interlining nonwoven. The fiber titer is a measure of the

fineness of the fibers and it is expressed in dtex, whereby 1 dtex = 1 g per 10,000 meters. Coarser titers lie within the range from 17 to 100 dtex, finer titers are within the range from 1.0 to 5.0 dtex (Ullmanns Enzyklopädie der Technischen Chemie [Ullmann's Encyclopedia of Industrial Chemistry], 4th edition, 1983, Volume 23, page 731).

As defined by the invention, the fibers can preferably be oriented in the nonwoven, that is to say, the individual fibers have a preferential direction. In lengthwise-oriented nonwovens, the fibers that lie in the lengthwise direction predominate, and in lengthwise-aligned nonwovens, all of the fibers lie in the lengthwise direction. Such oriented nonwovens have a slight lengthwise stretch and a high crosswise stretch (up to 100%).

With crosswise-oriented nonwovens, the fiber directions are virtually at a right angle with respect to each other, comparable to the warp and weft in woven fabrics, but at an angle of 45° to the lengthwise direction. The fiber orientation can vary from markedly crosswise oriented to lengthwise oriented. Such nonwovens have a good strength in the diagonal direction and, at the same time, a certain amount of stretch in the lengthwise and crosswise directions. Consequently, as defined by the invention, by setting preferential directions for the flat fibers, specific properties of the nonwoven fabric can be set. In particular, by combining several orientations of flat fibers in one nonwoven, advantageous properties such as, for example, dimensional stability, can be attained. It is, of course, also possible to combine several fiber webs, each with a different orientation of the flat fibers, to form a laminate in order to achieve an improved dimensional stability of the laminate.

The nonwovens can also be further stabilized by incorporating lengthwise and/or crosswise yarns in order to enhance the dimensional stability. The selected weight per unit area of the nonwovens depends on the requirements made in each individual case. Hence, the weight per unit area of the nonwoven can be just a few grams per square meter, or else several hundred grams per square meter, i.e. from 10 g/m² to 500 g/m², preferably from 15 g/m² to 200 g/m².

As defined by the invention, the fiber titer of the flat fibers used normally lies within the range from 1.0 dtex to 11.0 dtex, preferably from 1.7 dtex to 6.7 dtex.

The staple length of the staple fibers used according to the present invention normally lies within the range from 26 mm to 80 mm, preferably from 28 mm to 60 mm. However, mixtures of different staple lengths can also be used (Vario-staple).

Furthermore, the textile interlining nonwovens according to the invention exhibit a considerable reduction in penetration adhesion. The term penetration adhesion refers to the undesired penetration of the textile interlining nonwoven by an adhesive compound when the textile interlining nonwoven according to the invention is, for example, glued to a textile fabric.

It is especially advantageous if the fiber cross section of the thermoplastic fibers is virtually rectangular, ellipsoidal, zigzag or bone-shaped.

The term "rectangular" as defined by the invention refers to any fiber cross section that has a virtually rectangular shape except for the corner areas.

The term ellipsoidal as defined by the invention refers to any fiber cross section that is ellipse-like or virtually oval.

The term "zigzag" as defined by the invention refers to any fiber cross section that, relative to the lengthwise axis L of the fiber cross section, bends at least once, preferably at least twice, in approximately the opposite direction. The angle that is included by two adjacent fiber legs of the fiber cross section obeys the following equation: $0° < \text{angle} < 180°$. For further illustration, please see Figure 4.

The term "bone-shaped" as defined by the invention means that the fiber cross section looks like an ellipsoidal body that is constricted in the middle area of the lengthwise axis L of the fiber cross section vis-à-vis the width b as compared to the width b of the two ends of the fiber cross section. In this context, please see Figures 2 and 3 for further illustration.

It is preferable for the thermoplastic flat fibers to have a cross section with a length-to-width (L-to-b) ratio of the fiber cross section within the range from 1.5 : 1 to 6 : 1 (length : width), preferably from 2 : 1 to 4 : 1.

With the above-mentioned ratios of length to width in the fiber cross section, the textile interlining nonwoven according to the invention has a low penetration adhesion, an

especially good covering capacity and a high degree of softness. Of course, however, it is also possible to work outside of the fiber cross sections given as especially preferred, whereby as a rule, a somewhat higher penetration adhesion or a slightly lower covering capacity and softness of the textile interlining nonwoven are obtained.

It is especially preferred for the thermoplastic flat fibers to be made of a material that is selected from the group consisting of polyamide, polyester or blends thereof.

The polyesters used as defined by the invention are preferably selected from the group consisting of polyalkylene terephthalate, especially polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate or mixtures thereof. However, it is also possible to use other polyesters that have comparable properties.

It is extremely preferred for the thermoplastic flat fibers to be made of a polyamide that is selected from the group consisting of polyamide 6, polyamide 66, copolyamides which contain at least 70% by weight of caprolactone and/or adipic acid and hexamethylene diamine as the monomer building blocks or mixtures thereof. Additional comonomers can be terephthalic acid, isophthalic acid, sebacic acid, azelaic acid or dodecanoic diacid and 1,4-butane diamine.

Interlining nonwovens that are made of flat fibers of the above-mentioned materials achieve an improved covering capacity and a high degree of softness (hand).

Moreover, it is achieved that penetration adhesion is considerably reduced or does not occur at all.

It is advantageous for the thermoplastic flat fibers to be treated with a finishing agent containing silicon.

The finishing of the flat fibers especially facilitates the processing of the fibers. Furthermore, the finishing improves the antistatic properties of the flat fibers. In particular, the textile interlining nonwovens made with flat fibers that have been treated with finishing agents containing silicon have an even softer hand, which, especially in the case of articles of clothing, is very comfortable for the wearer of the garment.

Especially preferred finishing agents containing silicon are finishing agents containing polysiloxane. Of course, other finishing agents can be used as well.

Moreover, it is preferred for the textile interlining nonwoven to be provided with at least one coating on at least one surface. The term coating as defined by the invention is to be understood in such a way that the textile interlining nonwoven is coated on at least one side with an agent for the application of at least one flat textile structure. This coating is preferably a punctiform coating (many regularly or irregularly applied dots).

The means for the application of at least one flat textile structure onto at least one surface of the textile interlining nonwoven extremely advantageously allows a simple and rapid incorporation of the textile interlining nonwoven, for example, into articles of clothing.

In this context, the textile interlining nonwovens can be mechanically joined to the outer fabric, that is to say, sewed, pressed or hooked, for example. The textile interlining nonwovens according to the invention, however, are preferably provided with a coating that, for instance, allows a thermal fusing or hot-melt adhesion or heat-sealing with a textile outer fabric.

It is, of course, possible to join these textile interlining nonwovens to each other or to other textile interlining fabrics or laid yarns in order to produce a laminate comprising several layers that are identical and/or different from each other. The term laminate as defined by the invention refers to a composite of several layers consisting, at least partially, of layers of textile interlining fabrics joined to each other. This laminate consisting of several layers can, in turn, be joined to a textile outer fabric. Here, too, any coating can be applied onto both surfaces of the textile interlining fabric or of a laminate. Then textile outer fabrics can be applied onto these coatings or directly onto the two surfaces of the textile interlining nonwoven. This is advantageous, for example, in the production of collars, cuffs, hats, caps, shoes, especially for interliners, heel linings, reinforcement materials, tongues, etc.

It is very preferred for the agents to comprise an adhesive for application purposes.

As defined by the invention, the adhesive can be any suitable adhesive or any suitable adhesive mixture. The suitability of the adhesive is a function of the materials to be joined. In any case, it must be avoided that the adhesive attacks the materials to be joined,

i.e. for example, dissolves them. The adhesive can be applied in a homogeneous coating, in a mixed coating or in a coating of two or more adhesives applied several times over each other. The distribution of the adhesive can be regular or irregular, punctiform, patterned, in lamellae, in a rune-like, lozenge, flat or island-like manner, rolled on (calendered, ironed, flattened), foamed, etc.

In particular, the following adhesives are preferred, which are selected from the group consisting of adhesive glue, hot-melt adhesive, heat-sealing adhesive, glue, glue powder, melt adhesive glue, melt glue, sealing material, textile melt glue, thermoplastic glue.

Preferably, the adhesive compound is solid and non-adhesive at room temperature, but becomes increasingly fluid and tacky as the temperature rises. The adhesive compound can penetrate the surface of the flat textile structures to be joined and can anchor itself there after cooling and hardening sufficiently so that the two flat textile structures are joined to each other (fused, heat-sealed, glued).

As defined by the invention, the following adhesives are preferred:

- copolyamides with melting points between 60°C and 175°C [140°F and 347°F] that are made up of at least two of the following monomers: caprolactam, amino undecanoic acid, hexamethylene diamine, piperazine, adipic acid, azelaic acid, sebacic acid and dodecanoic diacid. Of course, other diamines and diacids can also be used;
- polyolefins such as, for example, HDPE and LDPE (high-density and low-density polyethylene);
- polyesters and copolyesters with melting points between 60°C and 175°C [140°F and 347°F] that are made up of at least one dicarboxylic acid and at least one diol. Moreover, the polyester can be made up entirely or partially of lactones such as caprolactone or butyrolactone, etc. Possible dicarboxylic acids include terephthalic acid, isophthalic acid, adipic acid, azelaic acid, sebacic acid, dodecanoic acid. Possible diols include 1,4-butane diol, 1,3-propane diol, 1,6-hexane diol and 1,4-cyclohexyl dimethanol. Of course, other diols and dicarboxylic acids can also be used.

Naturally, coatings such as, for example, metal and plastic films, can be applied onto the nonwovens. Moreover, additional substrates such as, for example, a polyurethane foam or a heat-sealable coating or adhesive compound can be applied onto the nonwoven. As far as the coatings are concerned that can likewise be applied onto the nonwovens, there are no limitations according to the invention.

It is very preferred for the textile interlining nonwoven to be a textile fusible interlining. As a rule, the term fusible interlining is used to refer to a textile interlining that can be glued. Therefore, the textile fusible interlining according to the invention comprises, for example, an applied thermoplastic adhesive compound which, through the action of temperature and optionally pressure for a certain period of time, creates an adhesive and permanent connection having the appropriate properties of use.

An extremely preferred embodiment of the invention relates to the use of thermoplastic flat fibers for the production of a textile interlining nonwoven having the above-mentioned properties and advantages.

The invention will now be explained in greater detail with reference to the examples that follow although it is not restricted to these.

Example 1

3.3-dtex polyamide 6 flat fibers were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. The flat fibers had a bone-like cross section with a length-to-width (L-to-b) ratio of 3 : 1. The staple length of the flat fibers was 43 mm.

The polyamide 6 flat fibers used to produce the nonwoven were manufactured by melt spinning PA 6 (commercial product Grilon A 28) that contained 0.3% by weight of titanium dioxide at 270°C [518°F] and at a take-off speed of 1100 m/min. The polyamide 6 flat fibers were thermoset at a temperature of 180°C [356°F]. The process to manufac-

ture polyamide staple fibers is described in detail in Ullmanns Enzyklopädie der Technischen Chemie [Ullmann's Encyclopedia of Industrial Chemistry], 5th edition, 1987, Volume A10, page 550 ff. The manufacture of the polyamide 6 flat fibers according to the invention only differs from this in terms of the specific geometries of the spinneret orifices employed.

Example 2

2.2-dtex polyamide 6 flat fibers (with 0.3% by weight of titanium dioxide) were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. The flat fibers had a bone-like cross section with a length-to-width (L-to-b) ratio of 3 : 1. The staple length of the flat fibers was 43 mm. The flat fibers and the nonwoven were manufactured by means of the method described in Example 1.

Example 3

3.3-dtex polyamide 6 flat fibers (with 0.3% by weight of titanium dioxide) which had been prepared with a finishing agent containing silicon were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. The flat fibers had a bone-like cross section with a length-to-width (L-to-b) ratio of 3 : 1. The staple length of the flat fibers was 43 mm. The finishing agent containing silicon consisted of the aqueous emulsion of a commercially available polysiloxane (Delion 431, Takemoto Oil & Fat Co. Ltd.). The application amounted to 0.3% relative to the fiber weight. The flat fibers and the nonwoven were manufactured by means of the method described in Example 1.

Example 4

A mixture consisting of 50% by weight of 3.3-dtex polyamide 6 fibers having a circular cross section and of 50% by weight of 3.3-dtex polyamide 6 flat fibers was used to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. Both types of fiber contained 0.3% by weight of titanium dioxide. The flat fibers had a bone-like cross section with a length-to-width (L-to-b) ratio of 3 : 1. The staple length of the polyamide 6 flat fibers and of the polyamide 6 fibers having the circular cross section was 43 mm in each case. The flat fibers and the nonwoven were manufactured by means of the method described in Example 1, whereby a spinneret having a circular orifice was used for the fibers having a circular cross section while a nozzle having the appropriate profile was employed for the flat fibers.

Example 5

3.3-dtex polyester (PET) flat fibers were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 220°C [428°F] and 9% bonding surface. The flat fibers had a bone-like cross section with a length-to-width (L-to-b) ratio of 3 : 1. The staple length of the flat fibers was 43 mm.

The polyester flat fibers used to produce the nonwoven were manufactured by melt spinning commercially available polyethylene terephthalate having a relative solution viscosity of 1.60 (measured in m-cresol; 1 g/100 mL) that contained 0.4% by weight of titanium dioxide at a temperature of 290°C [554°F]. The spinning speed was 1000 m/min. The fibers were thermoset at 190°C [374°F]. The process to manufacture staple fibers is

described in detail in Ullmanns Enzyklopädie der Technischen Chemie [Ullmann's Encyclopedia of Industrial Chemistry], 5th edition, 1987, Volume A10, page 550 ff. The manufacture of the polyamide 6 according to the invention only differs from this in terms of the specific geometries of the spinneret orifices employed.

Comparative Example 1

3.3-dtex polyamide 6 flat fibers (with 0.3% by weight of titanium dioxide) having a circular cross section were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. The staple length of the fibers was 43 mm. The flat fibers and the nonwoven were manufactured by means of a method analogous to that described in Example 1 although, instead of the flat fiber spinneret, a spinneret having a circular orifice was employed.

Comparative Example 2

1.7-dtex polyamide 6 fibers (with 0.3% by weight of titanium dioxide) having a circular cross section were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 184°C [363.2°F] and 9% bonding surface. The staple length of the fibers was 43 mm. The flat fibers and the nonwoven were manufactured by means of a method analogous to that described in Example 1.

Comparative Example 3

1.7-dtex polyester fibers (PET with 0.4% by weight of titanium dioxide) having a circular cross section were employed to produce a nonwoven having a weight per unit area of 22 g/m², which was then thermobonded by means of a calender at a temperature of 220°C [428°F] and 9% bonding surface. The staple length of the fibers was 43 mm. The flat fibers and the nonwoven were manufactured by means of a method analogous to that described in Example 5 although, instead of the flat fiber spinneret, a spinneret having a circular orifice was employed.

The nonwovens manufactured according to Examples 1 through 5 and Comparative Examples 1 through 3 were evaluated in terms of their penetration adhesion, their covering capacity and their hand. In order to assess the penetration adhesion, paste-dot coated webs (Griltex 8 P1; 10 to 12 g/m²) were laminated at 130°C [266°F] to an outer fabric (Pes/Wo 45%/55%) using a textile press (12s/5N) whereby in each case, two laminates were placed on each other and the two "web sides" were in direct contact with each other. In order to evaluate the penetration adhesion, the force necessary to separate the two laminates from each other (after they have cooled off) was measured. The higher the measured force, the greater the penetration adhesion of the laminate and thus also of the nonwoven. Therefore, a force of "zero" was measured on a web without penetration adhesion.

In order to assess the covering capacity, the sample webs were laid on a black background and then the "shining through" of the background through the sample web was evaluated in comparison to standard webs. The less the dark background is visible, the greater the covering capacity of the web. This evaluation was carried out by three independent test persons employing a scale ranging from 1 to 6, whereby 1 stands for very good and 6 for very poor covering capacity.

The assessment of the hand was likewise performed by three independent test persons employing a value scale ranging from 1 to 6, whereby 1 stands for a very hard and 6 for a very soft hand.

The results are compiled in Table 1.

Table 1

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3
Penetration adhesion [N/20 cm]	0	0	0	1	0	1.8	1.5	1.7
Covering capacity	2	1-2	2	3	2	4-5	3	3
Hand	2.5	2	1-2	3	3	4	3	4

The results show that the nonwovens made of flat fibers according to Examples 1 to 3 and Example 5 display a considerably greater covering capacity than the nonwovens made of fibers having a circular cross section (Comparative Examples 1 to 3), even though all of the nonwovens were made of fibers having approximately the same titer (as a rule, the finer the fiber titer, the better the covering capacity of the web). The nonwovens that consist exclusively of flat fibers (Examples 1 to 3, 5) do not exhibit any penetration adhesion, in contrast to which nonwovens that consist of fibers having a circular cross section display a more or less pronounced penetration adhesion. The softest hand is displayed by the nonwovens made of pure polyamide 6 flat fibers, whereby the undisputedly softest hand is exhibited by the web whose polyamide 6 flat fibers had been finished with a preparation containing silicon (Example 3).

In the case of the nonwovens made of polyester, the use of flat fibers in the web production also brings about a marked improvement of the hand (see Example 5 and Comparative Example 4 *[sic]*) whereby, however, the softness of the nonwovens made of pure polyamide 6 flat fibers was not matched.

Figures

The figures depict examples of embodiments of the flat fibers used according to the invention. Naturally, other cross sections of flat fibers according to the present invention can also be employed to prepare the textile interlining nonwovens according to the invention.

Figure 1 shows a cross section of a flat fiber having the length L and the width b. Except for the corner areas, the fiber shown has a virtually square cross section.

Figure 2 shows a cross section of a flat fiber having the length L and the width b. In the middle area, relative to the length L of the cross section of the flat fiber, the fiber shown has a constricted area in comparison to the width b of the edge areas of the flat fibers.

Figure 3 shows a fiber cross section that essentially corresponds to the fiber cross section from Figure 2 whereby, however, the constricted area that occurs in the middle area of the fiber is more pronounced in comparison to the width b of the edge areas.

Figure 4 shows a zigzag-like cross section with the projected length L and the projected width b.

It goes without saying that the embodiments above are meant only as examples and that they do not limit the scope of protection. It is obvious to the person skilled in the art that there are many possible ways to execute the invention disclosed here.

Patent Claims

1. A textile interlining nonwoven, **characterized in that** the textile interlining nonwoven is made up of staple fibers and comprises, at least partially, thermoplastic flat fibers.

2. The textile interlining nonwoven according to Claim 1, characterized in that the cross section of the thermoplastic flat fibers is approximately rectangular, ellipsoidal, zigzag or bone-shaped.

3. The textile interlining nonwoven according to Claim 1 or 2, characterized in that the thermoplastic flat fibers have a cross section with a length-to-width (L-to-b) ratio within the range from of 1.5 : 1 to 6 : 1, preferably from 2 : 1 to 4.

4. The textile interlining nonwoven according to one of Claims 1 through 3, characterized in that the thermoplastic flat fibers are made from a material selected from the group consisting of polyamide, polyester or mixtures thereof.

5. The textile interlining nonwoven according to Claim 4, characterized in that the thermoplastic flat fibers are made of a polyamide that is selected from the group consisting of polyamide 6, polyamide 66, copolyamides which contain at least 70% by weight of caprolactam and/or adipic acid and hexamethylene diamine as the monomer building blocks or mixtures thereof whereby, as additional comonomers, it is optionally possible to employ terephthalic acid, isophthalic acid, sebacic acid,

azelaic acid or dodecanoic diacid and 1,4-butane diamine either alone or in a combination.

6. The textile interlining nonwoven according to Claim 4, characterized in that the thermoplastic flat fibers are made of a polyester that is selected from the group consisting of polyalkylene terephthalate, especially polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate or mixtures thereof.

7. The textile interlining nonwoven according to one of Claims 1 through 6, characterized in that the thermoplastic flat fibers are treated with a finishing agent.

8. The textile interlining nonwoven according to Claim 7, characterized in that the finishing agent contains silicon.

9. The textile interlining nonwoven according to one of Claims 1 through 8, characterized in that, at least on one of its surfaces, the textile interlining nonwoven has a means that serves for the application of at least one flat textile structure.

10. The textile interlining nonwoven according to Claim 9, characterized in that the means that serves for the application is an adhesive compound.

11. The textile interlining nonwoven according to Claim 9, characterized in that the textile interlining nonwoven is a fusible interlining.

12. Use of thermoplastic flat fibers for the production of a textile interlining nonwoven according to one of Claims 1 through 11.

1 page of appertaining drawings

Translation: Language Services Unit
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Translators
January 9, 2001

DRAWINGS - PAGE 1

Number: DE 198 23 926 A1
Int. Cl.[6]: D 04 H 1/42
Publication date: December 2, 1999

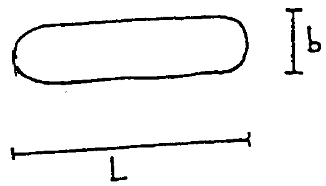

Fig. 1

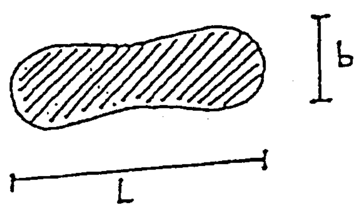

Fig. 2

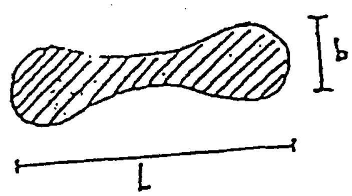

Fig. 3

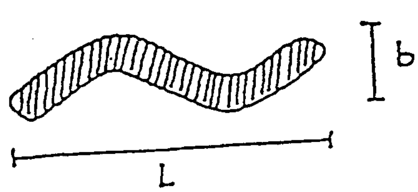

Fig. 4